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## **Differences in health status and health behaviour among young Swiss adults between 1993 and 2003**

Mohler-Kuo, Meichun ; Wydler, Hans ; Zellweger, Ueli ; Gutzwiller, Felix

**Abstract:** **OBJECTIVE:** Very few studies specifically have examined the health status of 20-year-olds. The purpose of the present study is to examine the changes in health status and behaviour among young Swiss adults between 1993 and 2003. **METHODS:** The present study used data from the Swiss Federal Surveys of Adolescents, conducted in 1993 and 2003 among 20-year-olds in Switzerland. The study sample included military recruits and a representative community cohort. More than 20,000 subjects participated in each survey. **RESULTS:** Young adults in 2003 reported fewer traffic- and sports-related accidents, but more work-related and other accidents versus young adults in 1993. A greater percentage of men were overweight or obese in 2003. Also in 2003, a greater percentage of males and females regularly used alcohol, cigarettes and cannabis. In particular, the number that smoked cigarettes daily increased by almost 30% and daily cannabis users increased more than two-fold. Young adults reported higher rates of inter-personal violence and theft in 2003. Compared to 1993, in 2003 young adults were more likely to report a sense of coherence; they also had fewer thoughts of suicide, but a greater sense that life is meaningless. **CONCLUSIONS:** Our study provides the first Swiss data comparing the health status of 20-year-olds a decade apart. The findings suggest a significant increase in substance use. Health prevention efforts among young adults ages 18-24 should focus on substance use. In addition, developing strategies to decrease interpersonal violence, delinquent behaviour, and obesity should be a major public health priority.

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# Differences in health status and health behaviour among young Swiss adults between 1993 and 2003

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## Summary

**Objective:** Very few studies specifically have examined the health status of 20-year-olds. The purpose of the present study is to examine the changes in health status and behaviour among young Swiss adults between 1993 and 2003.

**Methods:** The present study used data from the Swiss Federal Surveys of Adolescents, conducted in 1993 and 2003 among 20-year-olds in Switzerland. The study sample included military recruits and a representative community cohort. More than 20,000 subjects participated in each survey.

**Results:** Young adults in 2003 reported fewer traffic- and sports-related accidents, but more work-related and other accidents versus young adults in 1993. A greater percentage of men were overweight or obese in 2003. Also in 2003, a greater percentage of males and females regularly used alcohol, cigarettes and cannabis. In particular, the number that smoked cigarettes daily in-

creased by almost 30% and daily cannabis users increased more than two-fold. Young adults reported higher rates of inter-personal violence and theft in 2003. Compared to 1993, in 2003 young adults were more likely to report a sense of coherence; they also had fewer thoughts of suicide, but a greater sense that life is meaningless.

**Conclusions:** Our study provides the first Swiss data comparing the health status of 20-year-olds a decade apart. The findings suggest a significant increase in substance use. Health prevention efforts among young adults ages 18–24 should focus on substance use. In addition, developing strategies to decrease interpersonal violence, delinquent behaviour, and obesity should be a major public health priority.

**Key words:** health survey; health status; health status indicators; Switzerland; young adults

## Introduction

Early adulthood is an important developmental milestone, especially for 20-year-old adults. This is a transition period between adolescence and adulthood. Especially in Switzerland, important changes in school, work and living arrangements occur at this age, because young adults typically enter university or the work force after an apprenticeship. Consequently, physical and psychosocial health-related outcomes and behaviour at this time of life could impact health later. However, data on the health status of this age group are insufficient. Most health surveys or data sources have not specifically reported on the health status of this age group [1, 2], and they often have reported health indicators using a 10-year age range (for example, 15–24 years or 20–29 years). In addition, most health surveys have included respondents 15 or older; hence, the number of actual 20-year-olds in the sample often is very small [1].

In Switzerland, two major health surveys have

included respondents in this age group. The *Swiss Health Survey*, that is conducted every 5 years, targets the general population, ages 15 years and older [1]. However, this survey was not designed to specifically investigate health among young adults. The *Swiss Multi-Centre Adolescent Survey on Health* (SMASH) is the other survey, which was conducted first in 1992–1993 [3] and again in 2002 [4]. The SMASH targeted adolescents 16–20 years of age who attended post-mandatory schools or vocational training programmes. In Europe, the *European Housing and Health Survey* targeted households and did not specifically report the

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## Abbreviations

SOC	sense of coherence
SMASH	Swiss Multi-Centre Adolescent Survey on Health
BMI	body mass index

health status of young adults [5]. The *Health Behaviour in School Age Children Study*, a World Health Organization sponsored international survey with 35 participating countries, in 2001/2002 targeted children aged 11–15 [6].

However, due to differences in school environment, working status, and living arrangements, health-related outcomes and behaviour likely differ between 15 and 20-year-olds. In addition, a

school-based population may differ from the general population. Therefore, the present study has examined various health outcomes and health related behaviour, specifically focusing on 20-year-old adults. The purpose of the present study was to examine differences in health status and behaviour among young adults in Switzerland between 1993 and 2003.

## Methods

### Study design and participants

The present study used data from two large cross-sectional surveys, one conducted in 1993 and a similar survey conducted in 2002/2003 (hereafter, 2003 will be used throughout the paper) among 20-year-old adults in Switzerland. These surveys were carried out as part of the *Swiss Federal Surveys of Adolescents*, known as *ch-x*. The *ch-x* historically was conducted in military recruits to assess the education system in Switzerland. It later evolved into an instrument used in youth and adolescent research. In Switzerland, all 20-year-old men have 16 weeks of mandatory military service. However, for various reasons such as education, health status, and employment commitments, men's age in military service can vary from 18 to the mid-20s. Approximately 97% of the recruits in 1993 and 96% of the recruits in 2003 were approximately 20-years-old.

The *ch-x* surveys have been conducted yearly, on different topics. In addition, a community sample has been included in the survey. The surveys were approved by the Federal Commission of the Swiss Federal Survey of Adolescents. Participation always has been voluntary and anonymous. In 1993 the survey focussed on health-related topics for the first time, and a similar survey was repeated in 2003.

In 1993, 22,287 recruits participated in the survey. However, due to technical scanning problems (machine reading error, approximately 29% of the respondents) and incomplete questionnaires (more than 40% of the questions not answered; approximately 1% of the respondents), the final analytic sample consisted of 15,057 questionnaires in 1993. A similar sampling procedure was used in the 2003 survey. In the 2003 survey, 19,063 recruits participated and the analytic sample included 18,976 participants (exclusions primarily due to incomplete surveys; more than 40% of the questions not answered).

In addition to the recruit sample, a representative sample of 20-year-old adults was selected, based upon two-stage sampling in Switzerland. According to the Berner sampling plan [7], of approximately 2,900 communities in Switzerland, 289 communities in 1993 and 141 communities in 2002/03 were randomly selected. In the selected communities, 20-year-old residents were selected for participation by means of systematic sampling (every  $i^{\text{th}}$  man and every  $i^{\text{th}}$  woman). The sampling methods and inclusion criteria are described elsewhere in detail [8]. In 1993, 10,815 20-year-olds were selected to participate in the survey. Among them, 5,426 (50.2%) returned the questionnaire. In 2003, financial constraints forced reduction of the representative sample. Of 2,732 selected to participate in the survey, 1,555 (56.9%) returned the questionnaire. The final analytic sample included 4,650 participants in 1993 and 1,424 in 2003. Exclusion was primarily due to the scanning problem (in 1993) and incomplete survey.

### Questionnaire

The self-administered questionnaire included closed-ended, pre-structured items to obtain self-report information on the health status of young adults. Whenever possible, these questions were based on those used previously in national or large surveys [9, 10]. The survey required 60 minutes to complete. The main topics included:

- Health status: psychosocial well-being, physical symptoms, and perception of self-image and body.
- Health behaviour: risk taking behaviour (substance use, violent/delinquent behaviour, and suicidal thoughts/events), and sexual history.
- Health determinants: demographic background, current life situation (job, education, family structure, social network, and social support), parent-child relationships, leisure activities, sports, and exercise.

### Procedure

The questionnaires were administered to the recruits in a classroom setting, by a group of trained staff from *ch-x*. The participants were instructed that participation was voluntary and anonymous, and that military staff would not see any of the questionnaires. There was no active refusal to participate the survey. However, we excluded about 1% of the respondents, ie those who had not answered more than 40% of the questions. The questionnaires were removed from the training camps immediately after completion.

The data from the community sample were collected by means of a mail survey. The *ch-x* repeat mailed the same questionnaires and a reminder letter to selected addresses. Additional phone calls were made to remind the participants to complete the survey. Participants were asked to mail the questionnaire to a central location and simultaneously to send a confirmation letter to the *ch-x* staff to end the reminder process.

### Measures

**Accidents.** The respondents were asked whether they had experienced work-related, traffic-related, sports-related, or other types of accidents over the preceding 12 months. Potential responses included: *never*; *yes, self-handled*; *yes, handled with outpatient treatment*; and *yes, treated at the hospital*. These items later were dichotomised to *No* (never; and yes, self-handled) and *Yes* (yes, handled with outpatient treatment; and yes, treated at the hospital).

**Physical symptoms.** The respondents were asked the frequency of a variety of physical symptoms, including headache, nervousness, insomnia, stomach disturbance, concentration difficulties, rapid/irregular heartbeat, hand trembling, nausea, sweating, nightmares, difficulties breathing, and weight loss. The response categories included *often*, *sometimes*, *seldom* and *never*. These items later were dichotomised to *No* (seldom and never) and *Yes* (often and sometimes).

**Body Mass Index.** Body mass index (BMI) was calculated based upon self-reported weight and height [weight in kg/(height in meters)<sup>2</sup>]. Subjects were categorised as *underweight* (BMI <18.5), *normal* (18.5–24.9), *overweight* (25–29.9), or *obese* (BMI ≥30).

**Substance use.** The respondents were asked about their use of alcohol, cigarettes and cannabis over the last 12 months. The response categories included *daily*, *weekly*, *monthly*, *yearly*, and *none*.

**Violent/delinquent behaviour.** The respondents were asked whether they had done any of the following in the last 12 months, including damaging property, hitting or beating someone, threatening someone, stealing, or breaking in. The response categories included *no*; *yes, 1–2 times*; and *yes, more than 2 times*. These items later were dichotomised to *No* and *Yes*.

**Sense of Coherence.** Sense of coherence (SOC) was hypothesised to be a stable disposition of personality that serves as a major coping resource for the preservation of health. According to Antonovsky, people with a strong SOC are more likely to consider a given situation as challenging, and thus maintain good health even during stressful life events [11]. SOC was assessed using Antonovsky's short 13-item instrument [11, 12]. These thirteen items are intended to measure three dimensions: *comprehensibility* (4 items), *manageability* (5 items), and *meaningfulness* (4 items). The respondents were asked to check their level of agreement with each of the items on a seven-point semantic differential scale (1 = *never happened* to 7 = *always happened*).

**Emotional well-being.** Emotional well-being was assessed by means of an instrument developed by Hurrelmann and Kolip, as part of the Youth Health Survey conducted by University Bielefeld in Germany (1994) [13, 14]. The 22-item scale can be categorised into four dimensions: *positive feelings* (7 items: happy, pleased, light-hearted, balanced, confident, successful, secure); *negative feelings* (8 items: sad, lonely, depressed, anxious, mentally-empty, helpless, superfluous, guilty); *feelings of aggressiveness* (3 items: angry, wrathful, galled), and *feeling stressed* (4 items: exhausted, overcharged, strained, tired). The respondents were asked to check the frequency of each item on a four-point scale (1 = *never*; 2 = *seldom*; 3 = *sometimes*; and, 4 = *often*).

**Feeling life is meaningless.** The respondents were asked whether they feel that life is meaningless. The response categories included *often*, *sometimes*, *very seldom*, and *never*.

**Suicidal thoughts.** The respondents were asked whether they ever had suicidal thoughts. The response categories included *never*, *once*, *seriously considered*, and *attempted*.

## Data analysis

The demographic characteristics of the analytic sample may not perfectly reflect the true population demographic characteristics in Switzerland (for example, due to the study design, we have over-sampled military recruits) and this may bias our assessment of health status. Therefore, weighted analyses were used throughout to obtain as accurate parameter estimates as possible. All statistical analyses were weighted using the STATA survey estimation procedure [15]. *Weighting* refers to the construction of a weighted variable. The basic form of weight is defined as the inverse of the inclusion probability of a selected element. Weights are multiplicative factors; that is, the estimated total is obtained by multiplying each data value by an appropriate weight and summing the results.

To reduce the possibility that any observed changes between 1993 and 2003 merely were due to changes in demographics, an estimation of rates in both survey years was adjusted using post-stratification weight. This procedure covered twelve strata (two genders by two sample groups [recruit vs non-recruit] by three language regions [German, French, and Italian]), using Switzerland's demographic data in 2002 (derived from Swiss federal office for statistics) as the reference. We then could not only compare the changes in health indicators over time, given the assumption that demographic characteristics remained constant (like 2002), we also could reduce potential selection bias caused by non-participation. Detail information about the weighting procedure is available upon request.

We used contingency tables to present the prevalence of the health indicators, including accidents, physical symptoms, BMI, and risk taking behaviour for both 1993 and 2003. Differences in the prevalence of health indicators between the two survey years were assessed using Pearson Chi-square statistics, corrected for survey design (post-stratification weight) by applying the second-order correction of Rao and Scott [16], and then converted into F statistics. We present the mean and standard deviation for the SOC scale and the item mean for each of the emotional well-being subscales.

## Results

Table 1 lists the participants' demographic characteristics. After weighting, the demographic distribution (recruit status, sex, and region) of the study participants was similar to 20-year-old adults in the 2002 Swiss population. The percentage of young adults who attended or completed college or university increased 40% from 1993 (23.3%) to 2003 (32.5%). The working status of the young adults over the 10-year period remained stable.

### Changes in accidents, physical symptoms, and BMI

There were significant differences in various physical-related outcomes. With respect to accidents, young adults in 2003 reported fewer traffic-related and sports-related accidents, but experi-

enced more work-related and other accidents compared to youth in 1993. In general, men reported more accidents than women did. In addition, gender differences in accidents over time were detected. Men reported significantly fewer traffic-related and sports-related accidents along with more work-related and other accidents in 2003 than in 1993. Similar trends were observed among women; however, the differences between 1993 and 2003 were not significant among women, except for sport-related accidents.

We examined 12 physical symptoms in both surveys (table 2). In general, women reported having more physical symptoms than men, except for strong heartbeat, hand trembling and sweating. Most of the physical symptoms were equally preva-

**Table 1**

Demographic characteristics of the study participants in the 1993 and 2003 surveys.

	1993 (N = 19617)		2003 (N = 20400)	
	Unweighted (%)	Weighted (%)	Unweighted (%)	Weighted (%)
<b>Sample</b>				
Recruit	76.8	26.9	93.0	27.0
Non-recruit	23.2	73.1	7.0	73.0
<b>Sex</b>				
Male	81.2	51.6	94.8	51.5
Female	18.8	48.4	5.2	48.5
<b>Region</b>				
German-speaking	74.1	73.5	78.1	73.5
French-speaking	21.2	22.7	18.1	22.7
Italian-speaking	4.7	3.8	3.8	3.8
<b>Education</b>				
Mandatory & other <sup>1</sup>	6.2	13.5	5.6	6.8
Vocational School 1–2 years	11.0	17.9	6.6	19.2
Vocational School 3–4 years	57.0	45.3	52.1	41.5
In College or University	25.8	23.3	35.7	32.5
<b>Working status</b>				
Full-time	36.7	33.1	39.2	31.0
Part-time	3.8	4.0	4.7	5.0
Apprentice	30.3	25.8	21.9	26.6
In school	22.6	30.9	23.6	31.1
Jobless	6.7	6.3	10.7	6.3

<sup>1</sup> categories, which cannot be classified into the Swiss education system

lent in 1993 and 2003. Detectable differences between 1993 and 2003 existed for headache (43.1% vs 45.7% in 1993 vs 2003, respectively), insomnia (20.7% vs 25.7% in 1993 vs 2003, respectively), strong heartbeat (30.2% vs 23.9%), nightmares, (12.7% vs 14.9%) and weight change (14.9% vs 19.1%). About one in five men (19.1% in 1993, 21.0% in 2003) reported five or more symptoms, whereas one in three women reported five or more symptoms (31.6% and 32.6%).

Mean BMI did not change over time. However, an opposite trend was observed between men and women. Almost 15% of men were either overweight or obese, compared with 11% men in 1993. Conversely, in 2003, slightly more women reported being underweight, albeit this difference was not statistically significant.

### Changes in health behaviour

Use of alcohol, cigarettes, and cannabis increased among both men and women. In 2003, about 45.2% of men reported using alcohol daily or weekly compared with 41.5% in 1993. For women, about 17.6% reported daily or weekly alcohol use in 2003 compared with 12.9% in 1993. The rate of daily smoking increased almost 10% for both over the 10-year period. In 2003, 2 in 5 (41.5%) men reported smoking daily and 1 in 3 (30.5%) women reported the same. Similarly, the

percentage using daily cannabis more than doubled, from 6.7% in 1993 to 14.6% in 2003 among men, and from 1.2% in 1993 to 5.2% in 2003 among women. Young adults in 2003 had a higher rate of hitting or beating someone and stealing than young adults in 1993. Men reported more violent/delinquent behaviour than women.

### Changes in psychosocial well-being

Young adults in 2003 reported a stronger SOC than young adults in 1993. Young men scored higher on the total scale and on the manageability and comprehensibility subscales. In contrast, women scored higher on the meaningfulness subscale in both survey years. In general, young adults reported fewer positive emotions in 2003 versus young adults in 1993. Men and women did not differ between the two survey years. Young adults in 2003 also reported fewer negative feelings, aggression, and stress. In addition, women reported higher scores negative feelings, aggression, and stress than men did.

Young adults in 2003 more often reported the feeling that “life is meaningless” than young adults in 1993. More young adults in 2003 reported never having suicidal thoughts compared with young adults in 1993 (54.4% vs 48.6%). The proportion of young adults with suicide attempts and serious thoughts of suicide did not change over time.



**Table 2**

Differences in Health-related Outcomes between 1993 and 2003.

	Total			Males			Females		
	1993	2003	P-	1993	2003	P-	1993	2003	P-
<b>Accidents</b>									
Work-related	5.0 [4.6, 5.5]	6.6 [5.8, 7.4]	<0.01	7.2 [6.5, 8.0]	10.0 [8.9, 11.3]	<0.01	2.6 [2.2, 3.2]	2.9 [2.0, 4.2]	0.71
Traffic-related	3.7 [3.2, 4.1]	2.9 [2.3, 3.5]	0.05	4.7 [4.0, 5.4]	3.5 [2.9, 4.3]	0.03	2.6 [2.1, 3.2]	2.2 [1.4, 3.5]	0.55
Sports-related	14.2 [13.4, 15.0]	11.7 [10.6, 12.9]	<0.01	17.7 [16.4, 19.0]	15.7 [14.3, 17.2]	0.05	10.4 [9.4, 11.4]	7.4 [5.8, 9.3]	<0.01
Other	5.2 [4.8, 5.8]	7.8 [6.9, 8.9]	<0.01	5.1 [4.4, 5.8]	9.3 [8.2, 10.6]	<0.01	5.4 [4.8, 6.2]	6.2 [4.8, 8.0]	0.37
Any of the above	26.2 [25.2, 27.2]	22.3 [20.8, 23.9]	<0.01	31.9 [30.4, 33.5]	28.9 [27.1, 30.7]	0.01	20.0 [18.7, 21.3]	15.3 [13.1, 17.9]	<0.01
<b>Physical Symptoms</b>									
Headache	43.1 [41.9, 44.2]	45.7 [43.7, 47.6]	0.023	33.3 [31.7, 34.8]	34.6 [32.6, 36.6]	0.30	53.4 [51.8, 55.0]	57.1 [53.9, 60.5]	0.05
Nervousness	54.2 [53.1, 55.4]	52.9 [50.9, 54.8]	0.24	50.1 [48.5, 51.8]	49.3 [47.2, 51.3]	0.52	58.6 [57.0, 60.2]	56.7 [53.4, 60.0]	0.33
Insomnia	20.7 [19.8, 21.7]	25.7 [24.0, 27.5]	<0.01	18.1 [16.7, 19.5]	22.9 [21.2, 24.8]	<0.01	23.5 [22.1, 24.9]	28.7 [25.7, 31.8]	<0.01
Stomach disturbance	27.1 [26.1, 28.3]	27.9 [26.2, 29.8]	0.46	20.5 [19.0, 22.1]	21.7 [20.1, 23.5]	0.29	33.3 [31.8, 34.9]	34.5 [31.3, 37.7]	0.52
Concentration difficulties	46.6 [45.3, 47.9]	44.6 [42.7, 46.6]	0.11	46.4 [44.2, 48.6]	43.7 [41.7, 45.7]	0.08	46.8 [45.1, 48.4]	45.6 [42.3, 49.0]	0.56
Strong Heartbeat	30.2 [29.2, 31.3]	23.9 [22.3, 25.7]	<0.01	31.8 [30.3, 33.2]	24.8 [23.1, 26.6]	<0.01	28.5 [27.1, 30.0]	23.0 [20.3, 26.0]	<0.01
Hand trembling	22.3 [21.3, 23.3]	21.0 [19.5, 22.6]	0.17	23.4 [22.0, 24.8]	22.9 [21.2, 24.6]	0.66	21.1 [19.8, 22.5]	19.0 [16.5, 21.8]	0.17
Nausea	17.6 [16.8, 18.5]	16.7 [15.2, 18.3]	0.31	11.7 [10.7, 12.8]	11.2 [10.0, 12.5]	0.49	24.0 [22.6, 25.4]	22.5 [19.8, 25.5]	0.37
Sweats	21.0 [20.1, 22.0]	20.5 [19.0, 22.1]	0.57	22.2 [20.8, 23.6]	22.8 [21.1, 24.5]	0.59	19.8 [18.5, 21.1]	18.1 [15.6, 20.8]	0.26
Nightmares	12.7 [11.9, 13.5]	14.9 [13.5, 16.4]	<0.01	9.3 [8.3, 10.3]	10.1 [8.9, 11.5]	0.29	16.3 [15.2, 17.6]	19.9 [17.3, 22.7]	0.01
Difficulty breathing	13.1 [12.3, 13.9]	14.2 [12.9, 15.7]	0.16	12.0 [10.9, 13.1]	13.1 [11.7, 14.6]	0.23	14.3 [13.2, 15.5]	15.5 [13.2, 18.1]	0.39
Weight change	14.9 [14.1, 15.8]	19.1 [17.5, 20.8]	<0.01	8.1 [7.2, 9.1]	11.4 [10.2, 12.8]	<0.01	22.2 [20.8, 23.6]	27.1 [24.2, 30.2]	<0.01
5 or more symptoms	25.2 [24.2, 26.2]	26.7 [24.9, 28.5]	0.16	19.1 [17.7, 20.5]	21.0 [19.4, 22.8]	0.08	31.7 [30.2, 33.2]	32.6 [29.5, 35.8]	0.62
BMI (mean)	21.8 [21.7, 21.9]	21.8 [21.7, 21.9]	0.78	22.5 [22.4, 22.6]	22.5 [22.4, 22.6]	0.49	21.1 [21.0, 21.2]	21.1 [20.9, 21.3]	0.86
<b>BMI (category)</b>			<0.01			<0.01			<0.01
Underweight (BMI <18.5)	8.1 [7.4, 8.8]	8.5 [7.4, 9.8]		4.1 [3.4, 5.0]	3.4 [2.7, 4.2]		12.2 [11.1, 13.4]	14.0 [11.8, 16.5]	
Normal (18.5≤BMI <25)	82.3 [81.4, 83.3]	79.9 [78.3, 81.4]		84.9 [83.6, 86.1]	81.8 [80.1, 83.3]		79.6 [78.2, 81.0]	77.9 [74.9, 80.5]	
Overweight& obese (BMI ≥25)	9.5 [8.9, 10.3]	11.6 [10.4, 12.8]		10.9 [9.9, 12.0]	14.8 [13.4, 16.3]		8.1 [7.2, 9.1]	8.1 [6.4, 10.1]	

## Discussion

The present study revealed a significant increase in substance use among Swiss young adults over a 10-year period. The results from our study are consistent with other studies. Compared with SMASH and the Swiss Health Survey, similar rates of accidents and substance use were identified [4, 17].

The present study uncovered a slight increase

in work-related accidents, fewer sports-related accidents, and an increased percentage of overweight and obese men. The major change we observed, however, was a significant increase in substance use over the 10-year period, with a more pronounced increase apparent among women. Weekly and more frequent alcohol consumption increased 9% among men and approximately 36% among

**Table 3**

Differences in Health Behaviour between 1993 and 2003.

	Total			Males			Females		
	1993	2003	P-	1993	2003	P-	1993	2003	P-
<b>Alcohol use</b>			<0.01			<0.01			<0.01
None	6.6 [6.1, 7.3]	6.5 [5.5, 7.6]		5.5 [4.7, 6.4]	4.6 [3.8, 5.6]		7.9 [7.0, 8.8]	8.5 [6.8, 10.5]	
Yearly	28.1 [27.1, 29.3]	19.7 [18.1, 21.4]		18.0 [16.6, 19.4]	12.0 [10.8, 13.7]		38.9 [37.3, 40.5]	27.8 [24.9, 30.9]	
Monthly	37.6 [36.4, 38.7]	41.9 [40.0, 43.9]		3<4.9 [33.3, 36.6]	38.0 [36.0, 40.0]		40.3 [38.7, 42.0]	46.1 [42.8, 49.4]	
Weekly	22.3 [21.4, 23.3]	27.1 [25.5, 28.7]		32.4 [30.9, 34.0]	38.0 [36.1, 40.0]		11.6 [10.6, 12.7]	15.5 [13.2, 18.1]	
Daily	5.3 [4.9, 5.8]	4.8 [4.1, 5.5]		9.1 [8.4, 10.0]	7.2 [6.3, 8.3]		1.3 [1.0, 1.7]	2.1 [1.4, 3.4]	
<b>Cigarettes</b>			<0.01			<0.01			<0.01
None	48.2 [47.0, 49.4]	44.2 [42.1, 46.1]		41.2 [39.5, 42.9]	36.8 [34.8, 38.8]		55.6 [54.0, 57.3]	52.0 [48.6, 55.3]	
Yearly	14.6 [13.7, 15.4]	10.2 [9.0, 11.3]		15.9 [14.7, 17.2]	11.3 [10.1, 12.7]		13.1 [12.0, 14.3]	8.8 [7.0, 10.9]	
Monthly	5.1 [4.7, 5.7]	5.0 [4.3, 5.9]		5.8 [5.1, 6.6]	5.4 [4.6, 6.3]		4.4 [3.8, 5.2]	4.6 [3.4, 6.2]	
Weekly	4.3 [3.8, 4.8]	4.7 [3.9, 5.6]		4.9 [4.2, 5.6]	5.2 [4.3, 6.2]		3.7 [3.1, 4.4]	4.1 [3.0, 5.7]	
Daily	27.8 [26.8, 28.9]	36.1 [34.3, 37.9]		32.2 [30.6, 33.8]	41.5 [39.4, 43.3]		23.2 [21.8, 24.6]	30.5 [27.5, 33.6]	
<b>Cannabis</b>			<0.01			<0.01			<0.01
None	76.1 [75.0, 77.1]	64.1 [62.3, 65.9]		69.3 [67.7, 70.8]	56.5 [54.5, 58.5]		83.3 [82.0, 84.5]	72.1 [69.0, 75.0]	
Yearly	12.2 [11.5, 13.1]	15.2 [13.9, 16.6]		14.1 [13.0, 15.4]	15.6 [14.2, 17.1]		10.2 [9.2, 11.3]	14.8 [12.6, 17.3]	
Monthly	5.3 [4.8, 5.8]	6.5 [5.6, 7.4]		6.5 [5.7, 7.4]	7.5 [6.5, 8.6]		3.9 [3.3, 4.6]	5.4 [4.0, 7.1]	
Weekly	2.4 [2.1, 2.8]	4.3 [3.6, 5.0]		3.4 [2.9, 4.1]	5.8 [5.0, 6.8]		1.3 [1.0, 1.8]	2.6 [1.7, 3.9]	
Daily	4.0 [3.5, 4.6]	10.0 [9.0, 11.1]		6.7 [5.8, 7.6]	14.6 [13.2, 16.0]		1.2 [0.9, 1.6]	5.2 [3.9, 6.9]	
<b>Violence/ Delinquent</b>									
Damaged Property	8.4 [7.8, 9.0]	8.4 [7.6, 9.3]	0.96	12.3 [11.3, 13.3]	13.8 [12.6, 15.2]	0.06	4.3 [3.7, 5.0]	2.7 [1.8, 4.0]	0.03
Hit or Beat someone	7.7 [7.1, 8.4]	11.2 [10.1, 12.4]	<0.01	9.5 [8.6, 10.4]	14.7 [13.4, 16.1]	<0.01	5.9 [5.1, 6.7]	7.5 [5.9, 9.5]	0.08
Threatened someone	10.6 [9.9, 11.4]	9.9 [8.9, 11.0]	0.27	12.7 [11.6, 13.9]	13.5 [12.3, 14.9]	0.37	8.5 [7.6, 9.5]	6.1 [4.7, 7.9]	0.02
Stole	19.8 [18.9, 20.8]	22.9 [21.4, 24.5]	<0.01	24.6 [23.1, 26.2]	28.5 [26.7, 30.3]	<0.01	14.9 [13.7, 16.1]	17.0 [14.7, 19.7]	0.12
Broke in	2.0 [1.7, 2.4]	2.1 [1.7, 2.5]	0.94	3.7 [3.1, 4.4]	3.5 [3.0, 4.1]	0.72	0.3 [0.2, 0.6]	0.5 [0.2, 1.4]	0.44

women over the 10-year period. The daily use of cigarettes increased almost 30%. In 2003, two in five men (41.5%) and one in three women (30.5%) reported smoking daily, in spite of the National Tobacco Prevention Programme that was instituted in 1996. A major increase in daily smoking among 20-year-old adults also was observed in SMASH. Consistent with other studies, the increased prevalence of smoking among women was more pronounced than among men [4, 17–19]. The daily use of cannabis increased more than two-fold. Similarly, De Preux et al. reviewed findings from different surveys and reported that

cannabis consumption has increased dramatically since the early 1990s in Switzerland. Moreover, the increase was most noticeable among adolescents [20]. The present study showed an overall increase in SOC among both young men and women over the 10-year period. Previous studies have shown that people with a strong SOC are healthier and have a better sense of well-being than those who have a lower SOC [21–24]. Consistent with other studies [21, 24], the present study showed that women scored less favourably in terms of SOC than men did; consistent with this, they also reported more physical symptoms than men did.

**Table 4**

Differences in Psychosocial Well-being between 1993 and 2003.

	Total			Males			Females		
	1993	2003	P-	1993	2003	P-	1993	2003	P-
<b>Sense of Coherence</b>									
Total <sup>a</sup>	60.32 [60.05, 60.59]	61.47 [61.06, 61.91]	<0.01	60.98 [60.60, 61.36]	62.13 [61.68, 62.58]	<0.01	59.63 [59.25, 60.00]	60.76 [60.02, 61.58]	0.01
Manageability	18.45 [18.35, 18.56]	19.01 [18.83, 19.18]	<0.01	18.90 [18.75, 19.04]	19.48 [19.31, 19.66]	<0.01	17.99 [17.84, 18.14]	18.49 [18.18, 18.79]	<0.01
Comprehensibility	21.99 [21.87, 22.12]	22.31 [22.10, 22.51]	0.01	22.74 [22.56, 22.92]	22.93 [22.73, 23.14]	0.17	21.21 [21.03, 21.39]	21.63 [21.27, 21.99]	0.04
Meaningfulness	19.84 [19.74, 19.94]	20.16 [20.00, 20.31]	<0.01	19.30 [19.16, 19.45]	19.71 [19.55, 19.88]	<0.01	20.40 [20.26, 20.53]	20.64 [20.37, 20.91]	0.12
<b>Emotional Well-being<sup>b</sup></b>									
Positive	3.41 [3.39, 3.42]	3.30 [3.28, 3.32]	<0.01	3.40 [3.38, 3.42]	3.28 [3.26, 3.30]	<0.01	3.41 [3.39, 3.43]	3.32 [3.29, 3.35]	<0.01
Negative	2.25 [2.24, 2.26]	2.16 [2.14, 2.19]	<0.01	2.16 [2.14, 2.18]	2.08 [2.06, 2.11]	<0.01	2.34 [2.32, 2.36]	2.25 [2.21, 2.29]	<0.01
Aggressive	2.85 [2.83, 2.88]	2.67 [2.65, 2.70]	<0.01	2.78 [2.75, 2.81]	2.61 [2.58, 2.63]	<0.01	2.93 [2.90, 2.96]	2.75 [2.71, 2.79]	<0.01
Stressed	2.99 [2.97, 3.01]	2.85 [2.83, 2.87]	<0.01	2.97 [2.95, 3.01]	2.80 [2.78, 2.82]	<0.01	3.01 [2.98, 3.04]	2.90 [2.87, 2.94]	<0.01
<b>Feel life is meaningless<sup>c</sup></b>			<0.01			0.05			0.02
Often	5.1 [4.6, 5.7]	7.1 [6.2, 8.1]		5.9 [5.1, 6.8]	7.6 [6.6, 8.8]		4.4 [3.8, 5.1]	6.5 [5.1, 8.4]	
Sometimes	18.5 [17.6, 19.4]	18.3 [16.9, 19.8]		17.6 [16.4, 19.0]	18.2 [16.7, 19.8]		19.4 [18.1, 20.7]	18.4 [16.0, 21.2]	
Very seldom	49.5 [48.3, 50.7]	46.7 [44.8, 48.6]		47.0 [45.4, 48.7]	44.8 [42.8, 46.9]		52.2 [50.5, 53.8]	48.7 [45.3, 52.0]	
Never	26.8 [25.8, 27.9]	27.9 [26.2, 29.7]		29.5 [27.9, 31.0]	29.3 [27.5, 31.3]		24.1 [22.7, 25.5]	26.4 [23.5, 29.4]	
<b>Suicidal thoughts<sup>c</sup></b>			<0.01			<0.01			0.02
Attempted	2.3 [2.0, 2.7]	2.0 [1.5, 2.7]		1.9 [1.5, 2.5]	1.5 [1.1, 2.0]		2.7 [2.2, 3.3]	2.6 [1.7, 3.9]	
Seriously considered	8.4 [7.7, 9.0]	8.3 [7.3, 9.4]		8.5 [7.5, 9.5]	7.5 [6.5, 8.6]		8.2 [7.4, 9.2]	9.1 [7.4, 11.3]	
Once	40.7 [39.6, 41.9]	35.3 [33.5, 37.2]		39.6 [37.9, 41.3]	34.7 [32.7, 36.5]		41.9 [40.3, 43.6]	36.1 [32.9, 39.4]	
Never	48.6 [47.4, 49.8]	54.4 [52.5, 56.3]		50.0 [48.3, 51.7]	56.5 [54.5, 58.5]		47.1 [45.5, 48.7]	52.2 [48.9, 55.5]	

<sup>a</sup> mean %, standard deviation

<sup>b</sup> item mean %, standard deviation

<sup>c</sup> prevalence, 95% confidence interval

Our results indicate that the percentage having attempted suicide and the percentage with serious suicidal thoughts did not change among young adults over the 10-year interval. Due to the unavailability of objective data on suicide attempts, our results cannot be compared with other studies. However, a recent study of Swiss mortality statistics identified no significant changes in suicide rates from 1989 to 1991 and from 1995 to 1997 among Swiss 20- to 24-year-olds [25].

### Strengths and limitations

The present study is unique because it includes a large sample of 20-year-old adults. No other health survey has targeted this age alone. Most prior health surveys have included respondents 15 years old and older, thereby limiting the number of 20-year-olds in the sample. Our survey covered a whole range of physical, behavioural, and psychosocial issues pertaining to young adults. Fi-

nally, the study included two cross-sectional surveys, conducted ten years apart, involving the same age group. This allowed us to assess differences in health status and behaviour among young adults over a 10-year period.

The results of the present study should be interpreted with some degree of caution, however, given invariable limitations in the study. First, due to the large sample size, even small differences readily became statistically significant, even though they might not be clinically meaningful. Second, due to the survey's design, the study sample was disproportionately composed of male military recruits. We used a weighting procedure to minimise the potential bias due to sample selection. The present study also is subject to the limitation of self-reports. However, methodological reviews of such surveys have demonstrated their validity and reliability when anonymity is guaranteed [26–28]. We also examined the possibility that



the military recruits under-reported their substance use, because the survey was conducted in a classroom and they might have been afraid to report substance use. A separate analysis using data from 1993 and 2003 did not identify underreporting, however. For daily or weekly cannabis use, no significant differences between male military recruits and non-recruit men were observed (16.1% vs 14.9%,  $p = 0.276$ ). In addition, the military men reported significantly higher daily or weekly use of alcohol and tobacco versus male non-recruits (51.8% vs 39.3%, and 45.9% vs 42.2%, respectively).

Other limitations of the present study include a lack of measurement of the quantity of substance use and any formal mental health assessment. With respect to the use of substances like alcohol, it usually is more informative to obtain information on quantity than on frequency. The survey also did not include questions directly assessing mental health issues like depression. Finally, the instrument we used was designed for use in a self-report population study; therefore, it cannot be compared with instruments used for clinical diagnosis.

### Policy implications

Health prevention efforts among young adults, 18–24 of age, should focus on the use and

potential abuse of substances like alcohol, tobacco and cannabis. Despite many existing preventative and interventional programmes targeting substance use, our results suggest that the effects of these programmes might not be sufficient. Better coordination and integration of these programmes targeting the environment of young adults may be needed. General practitioners also may need to be more proactive addressing these issues. In addition, strategies to decrease interpersonal violence, delinquent behaviour, and obesity should be major public health priorities.

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## References

- Office fédéral de la statistique. Rapport de méthodes: Enquête suisse sur la santé 2002. Office fédéral de la statistique, série «Statistique de la Suisse, 14 santé» Neuchâtel 2005.
- Health in Europe – Results from 1997–2000 surveys. Luxembourg: Office for Official Publications of the European communities. Available at [http://epp.eurostat.cec.eu.int/cache/ITY\\_OFFPUB/KS-57-03-184/EN/KS-57-03-184-EN.PDF](http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-57-03-184/EN/KS-57-03-184-EN.PDF). Accessed January 7 2004.
- Narring F, Tschumper A, Michaud PA, Vanetta F, Meyer R, Wyder H, et al. La santé des adolescents en Suisse. Rapport d'une enquête nationale sur la santé et styles de vie des 15–20 ans. Lausanne: Institut universitaire de médecine sociale et préventive 1994.
- Narring F, Tschumper A, Inderwildi Bonivento L, Jeannin A, Addor V, Bütikofer A, et al. Gesundheit und Lebensstil 16- bis 20-Jähriger in der Schweiz (2002). SMASH 2002: Swiss multi-center adolescent survey on health 2002. Lausanne: IUMSP 2004.
- Xavier R Bonnefoy, Matthias Braubach, Brigitte Moissonnier, Kubanychbek Monolbaev, Nathalie Röbbel. Housing and Health in Europe: Preliminary Results of a Pan-European Study. *Am J Public Health* 2003;93:1559–63.
- Currie C, et al. (eds.) 2004. Young People's Health in Context: Health Behaviour in School-aged Children (HBSC) study: international report from the HBSC 2001/02 survey. WHO Policy Series: Health policy for children and adolescents Issue 4, WHO Regional Office for Europe, Copenhagen.
- Fritschi P, Meyer R, Schweizer W. Ein neuer Stichprobenplan für ein gesamtschweizerisches Sample. *Schweiz Zeitschr Soz* 1976;3:149–58.
- Wyder H, Walter T, Hättich A, et al. Die Gesundheit 20-Jähriger in der Schweiz. Ergebnisse der PRP 1993. Aarau: Sauerländer 1996.
- Bundesamt für Statistik BFS (2005, Hrsg.). Gesundheit und Gesundheitsverhalten in der Schweiz 1992–2002. Schweizerische Gesundheitsbefragung. Neuchâtel: Reihe «Statistik der Schweiz», Bundesamt für Statistik.
- Universität Bielefeld, Jugendgesundheitsurvey. Sonderforschungsbereich Prävention und Intervention im Kindes- und Jugendalter (SFB 227) Fragebogen 1992.
- Antonovsky A. Unravelling the mystery of health: how people manage stress and stay well. San Francisco: Jossey-Bass Publishers 1987.
- Antonovsky A. The structure and properties of the sense of coherence scale. *Soc Sci Med* 1993;36:725–33.
- Kolip P, Hurrelmann K. Was ist Gesundheit im Jugendalter? Indikatoren für körperliches, psychisches und soziales Wohlbefinden. In: Kolip P. Lebenslust und Wohlbefinden Beiträge zur geschlechtsspezifischen Jugendgesundheitsforschung. Weinheim und München: Juventa Verlag 1994:25–46.
- Kolip P. Geschlecht und Gesundheit im Jugendalter. Die Konstruktion von Geschlechtlichkeit über somatische Kulturen. Opladen: Leske + Budrich 1997.
- StataCorp. Stata Statistical Software: Release 7.0. College Station, TX: Stata Corporation 2001.
- Rao JNK, Scott AJ. On Chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. *Ann Stat* 1984;12:46–60.
- Bundesamt für Statistik, BFS (Hrsg.). Schweizerische Gesundheitsbefragung – Gesundheit und Gesundheitsverhalten in der Schweiz 1997. Bundesamt für Statistik BFS, Reihe «Statistik in der Schweiz, 14 Gesundheit». Neuchâtel: 2000.
- Schmid HA. Evolution de la consommation de substances psychotropes chez les écolières et les écoliers en Suisse. Lausanne: Institut Suisse de prévention de l'alcoolisme et autres toxicomanies 2003.
- Currie C, Hurrelmann K, Settertobulte W, Smith R, Todd J. Health and Health Behavior among Young People. Copenhagen: World Health Organization 2000.
- De Preux E, Dubois-Arber F, Zobel F. Current trends in illegal drug use and drug related health problems in Switzerland. *Swiss Med Wkly* 2004;134:313–21.

- 21 Larsson G, Kallenberg K. Sense of coherence, socioeconomic conditions and health: Interrelationships in a nation-wide Swedish sample. *Eur J Pub Health* 1996;6:175–80.
- 22 Lundberg O, Nyström Peck M. Sense of coherence, social structure and health: evidence from a population survey in Sweden. *Eur J Pub Health* 1994;4:252–7.
- 23 Kivimäki M, Feldt T, Vahtera J, Nurmi J. Sense of coherence and health: evidence from two cross-lagged longitudinal sample. *Soc Sci Med* 2000;50:583–97.
- 24 Raty LK, Larsson G, Soderfeldt BA, Larsson BM. Psychosocial aspects of health in adolescence: the influence of gender, and general self-concept. *J Adolesc Health* 2005;6:530.e21–e28.
- 25 Schlueter V, Narring F, Münch U, Michaud PA. Trends in violent deaths among young people 10–24 years old, in Switzerland 1969–1997. *Eur J Epidemiol* 2004;19:291–7.
- 26 Cooper AM, Sobell MB, Sobell LC, Maisto SA. Validity of alcoholics' self-reports: Duration data. *Int J Addict* 1981;16:401–6.
- 27 Lundberg O, Manderbacka K. Assessing reliability of a measure of self-rated health. *Scand J Soc Med* 1996;24:218–24.
- 28 Midanik L. Validity of self report alcohol use: A literature review and assessment. *Br J Addict* 1988;83:1019–30.